**Idaho Department of Environmental Quality**

# Draft §401 Water Quality Certification

January 21, 2016

**NPDES Permit Number(s):** ID002842 City of Sandpoint Wastewater Treatment Plant

**Receiving Water Body:** Pend Oreille River

Pursuant to the provisions of Section 401(a)(1) of the Federal Water Pollution Control Act (Clean Water Act), as amended; 33 U.S.C. Section 1341(a)(1); and Idaho Code §§ 39-101 et seq. and 39-3601 et seq., the Idaho Department of Environmental Quality (DEQ) has authority to review National Pollutant Discharge Elimination System (NPDES) permits and issue water quality certification decisions.

Based upon its review of the above-referenced permit and associated fact sheet, DEQ certifies that if the permittee complies with the terms and conditions imposed by the permit along with the conditions set forth in this water quality certification, then there is reasonable assurance the discharge will comply with the applicable requirements of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, the Idaho Water Quality Standards (WQS) (IDAPA 58.01.02), and other appropriate water quality requirements of state law.

This certification does not constitute authorization of the permitted activities by any other state or federal agency or private person or entity. This certification does not excuse the permit holder from the obligation to obtain any other necessary approvals, authorizations, or permits.

## Antidegradation Review

The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051).

- Tier 1 Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.07).
- Tier 2 Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.08).
- Tier 3 Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.09).

DEQ is employing a water body by water body approach to implementing Idaho's antidegradation policy. This approach means that any water body fully supporting its beneficial uses will be considered high quality (IDAPA 58.01.02.052.05.a). Any water body not fully supporting its beneficial uses will be provided Tier 1 protection for that use, unless specific circumstances warranting Tier 2 protection are met (IDAPA 58.01.02.052.05.c). The most recent federally approved Integrated Report and supporting data are used to determine support status and the tier of protection (IDAPA 58.01.02.052.05).

## Pollutants of Concern

The Sandpoint Wastewater Treatment Plant discharges the following pollutants of concern: $BOD_5$, TSS, *E. coli*, chlorine, mercury, temperature, pH, phosphorus, ammonia, nitrate + nitrite, Kjeldahl nitrogen, arsenic, cadmium, total chromium, chromium VI, copper, cyanide, lead, nickel, silver, zinc and whole effluent toxicity (WET). Effluent limits have been developed for $BOD_5$, TSS, *E. coli*, chlorine, ammonia, mercury and phosphorus. No effluent limits are proposed for temperature, pH, nitrate + nitrite, Kjeldahl nitrogen, arsenic, cadmium, total chromium, chromium VI, copper, cyanide, lead, silver, zinc and WET. Although these pollutants are present in detectable amounts, none of the pollutants have a reasonable potential to exceed WQS. The Sandpoint Wastewater Treatment Plant intends to increase their design flow. Limits for their current permit were calculated using a 3.0 mgd (million gallons per day) design flow and the draft permit uses a 5.0 mgd design flow.

## Receiving Water Body Level of Protection

The Sandpoint Wastewater Treatment Plant discharges to the Pend Oreille River within the Pend Oreille Lake Subbasin assessment unit (AU) 17010214PN002_08 (Pend Oreille Lake to Priest River). This AU has the following designated beneficial uses: cold water aquatic life, domestic water supply, and primary contact recreation. In addition to these uses, all waters of the state are protected for agricultural and industrial water supply, wildlife habitat, and aesthetics (IDAPA 58.01.02.100).

According to DEQ's 2012 Integrated Report, this AU is not fully supporting one or more of its assessed uses. The cold water aquatic life use is not fully supported. Causes of impairment include total dissolved nitrogen gas (gas super-saturation) and temperature. As such, DEQ will provide Tier 1 protection (IDAPA 58.01.02.051.01) for the aquatic life use. The contact recreation beneficial use is unassessed. DEQ must provide an appropriate level of protection for the contact recreation use using information available at this time (IDAPA 58.01.02.052.05.c). Fecal coliform and *E. coli* monitoring from a USGS monitoring station near Newport, WA and the Sandpoint Water Treatment Plant indicate this use is fully supported (see Appendix A of this certification); therefore, DEQ will provide Tier 2 protection in addition to Tier 1, for the recreation beneficial use (IDAPA 58.01.02.051.01; 58.01.02.051.02).

## Protection and Maintenance of Existing Uses (Tier 1 Protection)

As noted above, a Tier 1 review is performed for all new or reissued permits or licenses, applies to all waters subject to the jurisdiction of the Clean Water Act, and requires demonstration that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. In order to protect and maintain designated and existing beneficial uses, a

permitted discharge must comply with narrative and numeric criteria of the Idaho WQS, as well as other provisions of the WQS such as Section 055, which addresses water quality limited waters. The numeric and narrative criteria in the WQS are set at levels that ensure protection of designated beneficial uses. The effluent limitations and associated requirements contained in the Sandpoint Wastewater Treatment Plant permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS.

Water bodies not supporting existing or designated beneficial uses must be identified as water quality limited, and a total maximum daily load (TMDL) must be prepared for those pollutants causing impairment. A central purpose of TMDLs is to establish wasteload allocations for point source discharges, which are set at levels designed to help restore the water body to a condition that supports existing and designated beneficial uses. Discharge permits must contain limitations that are consistent with wasteload allocations in the approved TMDL. The Pend Oreille River does not yet have an approved TMDL for temperature or total dissolved nitrogen gas.

Prior to the development of the TMDL, the WQS require the application of the antidegradation policy and implementation provisions to maintain and protect uses (IDAPA 58.01.02.055.04). As previously stated, the cold water aquatic life use in this Pend Oreille River AU is not fully supported due to excess total dissolved nitrogen gas and temperature. The City's discharge was found to have no reasonable potential to exceed WQS for total dissolved nitrogen gas and temperature (2012 Fact Sheet page 11). Because of the low temperature of the effluent and that total dissolved gas is not a pollutant found in municipal discharges, the City's discharge complies with IDAPA 58.01.02.054.04. The other pollutants of concern either have effluent limits that ensure compliance with WQS or there is no reasonable potential to exceed WQS.

In summary, the effluent limitations and associated requirements contained in the Sandpoint Wastewater Treatment Plant permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS. Therefore, DEQ has determined the permit will protect and maintain existing and designated beneficial uses in the Pend Oreille River in compliance with the Tier 1 provisions of Idaho's WQS (IDAPA 58.01.02.051.01 and 58.01.02.052.07).

## *High-Quality Waters (Tier 2 Protection)*

The Pend Oreille River is considered high quality for recreational uses. As such, the water quality relevant to recreational uses of the Pend Oreille River must be maintained and protected, unless a lowering of water quality is deemed necessary to accommodate important social or economic development.

To determine whether degradation will occur, DEQ must evaluate how the permit issuance will affect water quality for each pollutant that is relevant to recreational uses of the Pend Oreille River (IDAPA 58.01.02.052.05). These include the following: mercury, *E. coli*, zinc, nickel, cyanide, arsenic and nutrients**.** Effluent limits are set in the proposed and existing permit for only mercury, E.coli, and nutrients (discussion below).

For a reissued permit or license, the effect on water quality is determined by looking at the difference in water quality that would result from the activity or discharge as authorized in the current permit and the water quality that would result from the activity or discharge as proposed in the reissued permit or license (IDAPA 58.01.02.052.06.a). For a new permit or license, the effect on water quality is determined by reviewing the difference between the existing receiving

water quality and the water quality that would result from the activity or discharge as proposed in the new permit or license (IDAPA 58.01.02.052.06.a).

If degradation will occur, DEQ must then determine whether the degradation is significant. A Tier 2 analysis is not required for insignificant degradation. If the discharge will cause a cumulative decrease in assimilative capacity that is equal to or less than 10% from conditions in the Pend Oreille River as of July 1, 2011, then DEQ may determine the degradation is insignificant, taking into consideration the size and character of the discharge and the magnitude of its effect on the receiving water (IDAPA 58.01.02.052.08.a).

### Pollutants with Limits in the Current and Proposed Permit: *E. coli*

For pollutants that are currently limited and will have limits under the reissued permit, the current discharge quality is based on the limits in the current permit or license (IDAPA 58.01.02.052.06.a.i), and the future discharge quality is based on the proposed permit limits (IDAPA 58.01.02.052.06.a.ii). For the Sandpoint Wastewater Treatment Plant permit, this means determining the permit's effect on water quality based upon the limits for *E. coli* in the current and proposed permits. Table 1 provides a summary of the current permit limits and the proposed or reissued permit limits.

Effluent limits for *E. coli* in the proposed permit are the same as the previous permit and are protective of beneficial uses. However, the proposed increased design flow (3.0 mgd to 5.0 mgd) will theoretically increase the concentration of *E. coli* bacteria at the edge of a mixing zone. A Tier 2 analysis, however, is only required if the degradation is determined to be significant and significant degradation occurs when the discharge of the pollutant will cumulatively decrease the remaining assimilative capacity by more than 10% percent or, if less than 10%, when determined by the Department to be significant (IDAPA 58.01.02.052.08.a). Sandpoint's new design flow will reduce the assimilative capacity of *E. coli* by <1%. Since this value is less than 10% of the remaining assimilative capacity and determined by the Department to be an insignificant increase, no alternatives analysis or socioeconomic justification are required for the increase of *E. coli* in the Pend Oreille River (see Appendix A of this certification for the analysis).

### New Permit Limits for Pollutants Currently Discharged: Mercury, Phosphorus

When new limits are proposed in a reissued permit for pollutants in the existing discharge, the effect on water quality is based upon the current discharge quality and the proposed discharge quality resulting from the new limits. Current discharge quality for pollutants that are not currently limited is based upon available discharge quality data (IDAPA 58.01.02.052.06.a.i). Future discharge quality is based upon proposed permit limits (IDAPA 58.01.02.052.06.a.ii).

The proposed permit for Sandpoint Wastewater Treatment Plant includes new limits for mercury and phosphorus (Table 1). Since the current permit does not contain effluent limits for mercury or phosphorus, the proposed limits are based on discharge monitoring report (DMR) data and the existing ambient water quality in the Pend Oreille River. Due to the limited amount of phosphorus data and its variability, the entire record to date was used to develop the new effluent limits. The amount of the river necessary to dilute phosphorus to meet a criteria of 10µg/L (see Revised Fact Sheet Appendix E) exceeds 25% which triggered a closer examination of this mixing zone through data collection and modeling summarized in Appendices C and D of this certification (modeling reports are available upon request by calling the contact shown at the end

of this certification). Results of the modeling are reflected in the new effluent limits and a compliance schedule. Details of how the effluent limits were calculated can be found in Appendices E and F of the Revised Fact Sheet. Specifically, to ensure that there is no loss of assimilative capacity in the Pend Oreille River for mercury, the loads in the permit are based on the currently permitted design flow of 3mgd. New permit limits for phosphorus assure that there will be no degradation (see discussion in Appendix B of this certification). In conclusion, by limiting phosphorus loads with new effluent limits and modeling to verify effects of these new limits; restricting mercury discharges to those currently discharged; and requiring the execution of a mercury minimization plan (permit part I.E.); there should be no degradation of water quality as it relates to recreational beneficial uses.

### Pollutants with No Limits: Arsenic, Zinc, Cyanide and Nickel

There are several pollutants of concern (arsenic, zinc, cyanide and nickel) relevant to Tier 2 protection of recreation that currently are not limited and for which the proposed permit also contains no limit (Table 1). For such pollutants, a change in water quality is determined by reviewing whether changes in production, treatment, or operation that will increase the discharge of these pollutants are likely (IDAPA 58.01.02.052.06.a.ii). The Sandpoint Wastewater Treatment Plant has proposed a design flow increase of 2.0 mgd. There have been no changes in the industrial sector of Sandpoint that might increase their discharge concentration of these pollutants. However, the proposed increased design flow (3.0 mgd to 5.0 mgd) will theoretically increase the concentration of these pollutants at the edge of a mixing zone. A Tier 2 analysis, however, is only required if the degradation is determined to be significant and significant degradation occurs when the discharge of the pollutant will cumulatively decrease the remaining assimilative capacity by more than 10% percent or, if less than 10%, when determined by the Department to be significant (IDAPA 58.01.02.052.08.a). As shown in Appendix E of this certification, the increase in the design flow will not decrease the remaining assimilative capacity for these pollutants by more than 10%. Therefore, DEQ has determined there will be no significant degradation. Continued monitoring of new or increased discharges to the treatment system and their pollutants is required by part III. J. of the new permit to detect any changes as future flow increases. As such, the proposed permit should maintain the existing high water quality in the Pend Oreille River.

In summary, DEQ concludes that this discharge permit complies with the Tier 2 provisions of Idaho's WQS (IDAPA 58.01.02.051.02 and IDAPA 58.01.02.052.06).

**Table 1. Comparison of current and proposed permit limits for pollutants of concern relevant to uses receiving Tier 2 protection.**

| Pollutant | Units | Current Permit | | | Proposed Permit | | | Change[a] |
|---|---|---|---|---|---|---|---|---|
| | | Average Monthly Limit | Average Weekly Limit | Max Daily Limit | Average Monthly Limit | Average Weekly Limit | Max Daily Limit | |
| **Pollutants with limits in both the current and proposed permit** | | | | | | | | |
| Five-Day BOD | mg/L | 30 | 45 | — | 30 | 45 | — | I[b] |
| | lb/day | 750 | 1100 | — | 1251 | 1877 | — | |
| | % removal | 85% | — | — | 85% | — | — | |
| TSS | mg/L | 30 | 45 | — | 30 | 45 | — | I[b] |
| | lb/day | 750 | 1100 | — | 1251 | 1877 | — | |
| | % removal | 85% | — | — | 85% | — | — | |
| pH | standard units | 6.5–9.0 all times | | | 6.5–9.0 all times | | | NC |
| *E. coli* | no./100 mL | 126 | — | 406 | 126 | — | 406 | NC |
| Total Residual Chlorine | mg/L | 0.45 | 1.1 | — | 0.348 | — | 0.912 | D |
| | lb/day | — | — | — | 14.5 | — | 38.0 | |
| **Pollutants with new limits in the proposed permit** | | | | | | | | |
| Total Phosphorus (June-Sept) | µg/L | 1/qtr | — | Report | — | — | — | |
| | lb/day | — | — | — | 61 | 79 | — | NC |
| Total Phosphorus (Oct-May) | µg/L | — | — | — | — | — | — | |
| | lb/day | — | — | — | 96 | 125 | — | NC |
| Mercury | µg/L | 2/yr | — | Report | 0.56 | — | 1.1 | NC |
| | lb/day | — | — | — | 0.014 | — | 0.028 | |
| Ammonia | mg/L | — | — | — | 21.1 | — | 40.5 | D |
| | lb/day | — | — | — | 880 | — | 1689 | D |
| **Pollutants with no limits in both the current and proposed permit** | | | | | | | | |
| Temperature | °C | 1/day | — | Report | — | continuous | | NC |
| Total Ammonia | mg/L | 1/mo | — | Report | — | 1/mo | Report | NC |
| Nitrate + Nitrite | mg/L | 1/qtr | — | Report | — | 1/qtr | Report | NC |
| Kjeldahl Nitrogen | mg/L | 1/qtr | — | Report | — | 1/qtr | Report | NC |
| Arsenic | µg/L | 2/yr | — | Report | — | 2/yr | Report | NC |
| Cadmium | µg/L | " | — | Report | — | " | Report | NC |
| Total Chromium | µg/L | " | — | Report | — | " | Report | NC |
| Chromium VI | µg/L | " | — | Report | — | " | Report | NC |
| Copper | µg/L | " | — | Report | — | " | Report | NC |
| Cyanide | µg/L | " | — | Report | — | " | Report | NC |
| Lead | µg/L | " | — | Report | — | " | Report | NC |
| Nickel | µg/L | " | — | Report | — | " | Report | NC |
| Silver | µg/L | " | — | Report | — | " | Report | NC |
| Zinc | µg/L | " | — | Report | — | " | Report | NC |

[a] NC = no change in effluent limit from current permit; I = increase of pollutants from current permit; D = decrease of pollutants from current permit.

[b] EPA determined that the current water quality based effluent limits for TSS and BOD were unnecessary and that technology based effluent limits for these pollutants would not violate the dissolved oxygen WQS (Revised Fact Sheet Appendix D). Since the Pend Oreille River only receives Tier 1 protection for cold water aquatic life, pollutants significant to this use can be increased up to the WQS criteria (IDAPA58.01.02.052.07).

# Conditions Necessary to Ensure Compliance with Water Quality Standards or Other Appropriate Water Quality Requirements of State Law

# Compliance Schedules

Pursuant to IDAPA 58.01.02.400.03, DEQ may authorize compliance schedules for water quality-based effluent limits issued in a permit for the first time. Sandpoint Wastewater Treatment Plant cannot reliably achieve compliance with the effluent limits for ammonia and phosphorus; therefore, DEQ authorizes a compliance schedule and interim requirements as set forth below. This compliance schedule provides the permittee a reasonable amount of time to achieve the final effluent limits as specified in the permit. At the same time, the schedule ensures that compliance with the final effluent limits is accomplished as soon as possible. At the request of the City of Sandpoint, this schedule includes two options, one that utilizes their existing treatment plant and the other which allows time for the construction of a new treatment plant.

**Requirements for Compliance Schedule Option 1 and 2**

1. The permittee must comply with all effluent limitations and monitoring requirements in Part I.B., I.C. and I.D. beginning on the effective date of the permit, except those for which a compliance schedule is specified in Part II.F of the final permit.

2. The permittee must achieve compliance with the applicable final effluent limitations as set forth in Part I.B. (Table 1) of the permit no later than:

    a. Five (5) years after the effective date of the final permit for Option 1, or
    b. Ten (10) years after the effective date of the final permit for Option 2.

3. While the schedules of compliance specified in Part II.F of the permit are in effect, the permittee must complete interim requirements and meet interim effluent limits and monitoring requirements as specified in Parts I.B, I.C, I.D and I.E of the permit.

4. By one (1) year after the effective date of the final permit, the permittee must notify EPA and DEQ in writing that a preferred compliance schedule option has been selected and demonstrate that funding for the preferred option is secured for Option 1 or has a City of Sandpoint approved strategy for obtaining funding for Option 2.

## Option 1 Existing Plant Upgrades – 5 Year Schedule

This option applies if the City of Sandpoint decides to upgrade their existing treatment plant to meet final effluent limits.

1. By three (3) years after the effective date of the final permit, the permittee must provide for DEQ approval, a preliminary engineering report (PER) that examines how to improve

effluent quality and meet effluent limits associated with phosphorus and ammonia. This report must include details on how the proposed improvements will meet final effluent limits. The report shall include materials, costs, and a schedule for completion of the work.

2. By four (4) years after the effective date of the final permit, final plans and specifications for the modifications proposed in the PER shall be submitted to DEQ for approval.

3. By five (5) years after the effective date of the final permit, the permittee must have completed the plant upgrade and achieved compliance with final effluent limits and WQS as shown in Table 3.

## Option 2 New Treatment Plant – 10 Year Schedule

This option applies if the City of Sandpoint decides to construct a new treatment plant that will meet final effluent limits.

**Interim Requirements for Option 2 Compliance Schedule**

1. By three (3) years after the effective date of the final permit a facility plan shall be submitted to DEQ for review and approval. The facility plan shall include outlining estimated costs and schedules for construction of a new wastewater treatment plant and implementation of technologies to achieve final effluent limitations. This schedule must include a timeline for pilot testing.

2. By four (4) years after the effective date of the final permit, the permittee must provide EPA and DEQ with a progress report on funding for the new facility. Copy of notice of bond approval or notice of judicial confirmation is acceptable.

3. By five (5) years after the effective date of the final permit, the permittee must provide EPA and DEQ with written notice that design has been completed and approved by DEQ.

4. By six (6) years after the effective date of the final permit, the permittee must provide EPA and DEQ with a notice that bids for construction have been awarded to achieve final effluent limitations.

5. By seven (7) and eight (8) years after the effective date of the final permit, the permittee must provide EPA and DEQ with brief progress reports of construction as they relate to meeting the compliance schedule timeline and final effluent limits.

6. By nine (9) years after the effective date of the final permit, the permittee must provide EPA and DEQ with written notice that construction has been substantively completed on the facilities to achieve final effluent limitations.

7. By ten (10) years after the effective date of the final permit, the permittee must provide EPA and DEQ with a written report providing details of a completed start up and

optimization phase of the new treatment system and must achieve compliance with the final effluent limitations of Part I.B.

| Table 2. Interim Limits for Both Options | | | | |
|---|---|---|---|---|
| Parameter | Units | Average Monthly Limit | Average Weekly Limit | Mixing Zone |
| Phosphorus | lb/day | 96 | 125 | 60% |
| Ammonia | mg/L | effluent limit based on max DMR value from 6-20-10 through 7-31-15 of 32.8 | percent mixing zone for interim limit | ? |
| | lb/day | ? | | |

| Table 3. Final Limits for Both Options | | | | |
|---|---|---|---|---|
| Parameter | Units | Average Monthly Limit | Average Weekly Limit | Percent Mixing Zone |
| Phosphorus (June-September) | lb/day | 61 | 79 | 47% of the 30Q10 flow (6,640 cfs) |
| Phosphorus (October-May) | lb/day | 96 | 125 | 60% of the 30Q10 flow (8,260 cfs) |
| Ammonia | mg/L | 21.1 | Max Daily Limits<br>40.5 | 25% |
| | lb/day | 880 | 1689 | |

## Mixing Zones

Due to Sandpoint's desire for a design flow increase, DEQ and EPA modeled various scenarios related to the phosphorus mixing zone and downstream conditions in the Pend Oreille River. EPA did additional modeling to examine the acute and chronic mixing zones for ammonia, chlorine and mercury. These modeling efforts resulted in more stringent limits for phosphorus, ammonia and chlorine. The mixing zones for these pollutants and the rationale behind their use are described in detail in the modeling documentation and reports available from DEQ upon request. Pursuant to IDAPA 58.01.02.060, DEQ authorizes the mixing zones summarized in Table 4 for the current outfall location.

**Table 4: Mixing Zones**

| Pollutant | Mixing Zone (% of critical flow volumes of the Pend Oreille River) |
|---|---|
| ammonia interim limit | ?% |
| ammonia final limit | 25% |
| arsenic | 25% |
| chlorine | 25% |
| chromium III | 25% |
| chromium IV | 25% |
| copper | 25% |
| cyanide | 25% |
| lead | 25% |
| mercury | 25% |
| nitrate + nitrite | 25% |
| zinc | 25% |
| Phosphorus, June-September interim limit | 60% |
| Phosphorus, June-September final limit | 47% |
| Phosphorus, October-May | 60% |

## Other Conditions

This certification is conditioned upon the requirement that any material modification of the permit or the permitted activities—including without limitation, any modifications of the permit to reflect new or modified TMDLs, wasteload allocations, site-specific criteria, variances, or other new information—shall first be provided to DEQ for review to determine compliance with Idaho WQS and to provide additional certification pursuant to Section 401.

## Right to Appeal Final Certification

The final Section 401 Water Quality Certification may be appealed by submitting a petition to initiate a contested case, pursuant to Idaho Code § 39-107(5) and the "Rules of Administrative Procedure before the Board of Environmental Quality" (IDAPA 58.01.23), within 35 days of the date of the final certification.

Questions or comments regarding the actions taken in this certification should be directed to June Bergquist, Coeur d'Alene Regional Office at 208.666.4605 or via email at june.bergquist@deq.idaho.gov.

DRAFT

Daniel Redline
Regional Administrator
Coeur d'Alene Regional Office

# Appendix A

*E. coli* Significance Test

Background

The Pend Oreille River is considered high quality for recreational uses. To prevent the lowering of water quality with respect to *E. coli*, DEQ must ensure that the design flow increase proposed by the Sandpoint WWTP draft permit does not cumulatively decrease the remaining assimilative capacity of the river by more than ten percent taking into account the size and character of the discharge and the magnitude of its effect on the receiving water (IDAPA 58.01.02.052.08.a).

Assimilative capacity is determined by comparing the background (ambient) concentration of a pollutant with the Water Quality Standard (WQS). The difference between these two numbers is the remaining assimilative capacity.

Only two data sets were found to use for the establishment of a background level of *E. coli* concentration in the river above the WWTP discharge. There were 18 fecal coliform samples collected by the USGS at their monitoring station near Newport, WA from 1990 through 1995. The maximum value was 17 cfu/100ml and the average was 4 cfu/100ml. The other data set were 26 samples taken by the Sandpoint Water Treatment Plant in 2008-2009; however, those samples were drawn from a 14-25 foot depth depending on season, and may not be representative of bacteria levels closer to the surface where most recreational use occurs. The maximum value of this data set was 3 cfu/100ml. A background value of 4 cfu/100ml was selected for this analysis. Upstream monitoring has been added to the draft permit.

Analysis

- Background concentration upstream of Sandpoint discharge: 4 cfu/100ml
- *E. coli* effluent limit that must be met at the "end of the pipe" i.e. no mixing zone authorized: 126 cfu/100ml
- Remaining assimilative capacity: 126 – 4 = 122 cfu/100ml
- Ten percent of 122 cfu/100ml is: 12.2 ≈ 12 cfu/100ml. This is the amount of *E. coli* that can be added to the river before the amount becomes significant.
- Sandpoint proposes to increase their current design flow from 3.0 mgd (4.64 cfs) to 5.0 mgd (7.7 cfs).
- Effluent concentration (from draft permit average monthly limit): 126 cfu/100ml
- In-river 30Q5 flow (critical low flow for non-carcinogenic human health criteria; see Revised Fact Sheet Appendix C) = 7,360 cfs

Results

Current Mixed Concentration = 4.08 cfu/100ml
Proposed Mixed Concentration = 4.13 cfu/100ml

4.13 – 4.08 = 0.05 cfu/100ml (or 0.05/12 = 0.4%) is the reduction in assimilative capacity from the current design flow to the proposed design flow. This proposed increase of *E. coli* does not exceed 10% of the remaining assimilative capacity and considering the character of the discharge and magnitude of its effect on the Pend Oreille River, the Department has determined that this decrease is not a significant degradation of river water quality.

Formula used to calculate mixed concentrations:

Mixed Concentration = Cm = [ (Ce * Qe) +(Cu * Qu) ] / (Qe+Qu)

Where:

Cm = Mixed Concentration (µg/L)
Ce = Effluent Concentration (µg/L)
Qe = Effluent Volume (liters, calculated as flow rate in cfs * constant 28.316)
Cu = Upstream concentration (µg/L)
Qu = Upstream Volume (liters, calculated as flow rate in cfs * constant 28.316)

# Appendix B

Phosphorus and Antidegradation Review

Background

The Pend Oreille River is considered high quality for recreational uses and therefore, receives Tier 2 protection. Excess nutrients in a waterbody can create visible slime growths or other nuisance aquatic growths, impairing designated uses such as contact recreation. Pend Oreille River has a designated use for primary contact recreation. Phosphorus is likely the limiting nutrient for the growth of algae and other aquatic plants. To prevent the lowering of water quality with respect to total phosphorus, DEQ must ensure that the design flow increase proposed by the Sandpoint WWTP draft permit does not increase phosphorus in the river.

Analysis

- Background concentration upstream of Sandpoint discharge (see Revised Fact Sheet Appendix E): 7.3µg/L
- Phosphorus target concentration to be met at edge of a 47.2% mixing zone (see Revised Fact Sheet Appendix E and IDAPA 58.01.02.200.06): **10µg/L**
- Sandpoint proposes to increase their current design flow from 3 mgd (4.64 cfs) to 5 mgd (7.74 cfs).
- Current effluent concentration as calculated for the reasonable potential analysis (Revised Fact Sheet Appendix E) is *5330µg/L which is the maximum effluent concentration between June 2010 and August 2015.
- Proposed effluent limits for June-Sept is 1463µg/L and Oct-May is 2302µg/L (Fact Sheet Appendix E)
- In-river 30Q10 flow June- September = 6640 cfs and October – May 8260 cfs

*****IDAPA 58.01.02.052.06.a.iii indicates that the change in water quality for new permit limits for an existing discharge shall be calculated using the same statistical procedures used to determine the new effluent limits. The 5330 µg/L concentration is what was used by EPA in the reasonable potential analysis Fact Sheet Appendix E.

Results

Current Mixed Concentration = summer: 11.0 µg/L winter: 10.3µg/L

Both current concentrations exceed 10µg/L and therefore do not meet the water quality standard which is why EPA developed water quality-based effluent limits. These limits were verified and modified (a reduction) by CORMIX and CE-QUAL-W2 modeling efforts presented in Appendix C and D of this certification. The proposed water quality based limits are June-Sept 61 lbs/day (equivalent to a concentration of 1463µg/L) and Oct-May 96 lbs/day (equivalent to a

concentration of 2302µg/L). Using the proposed effluent limits and the new design flow of 5mgd the results are as follows:

Proposed Mixed Concentrations = summer: 8.99µg/L winter: 9.45µg/L

Both seasons show a lowering of phosphorus in the river between current and proposed conditions and therefore, no degradation.

Formula used to calculate mixed concentrations:

Mixed Concentration = Cm = [ (Ce * Qe) +(Cu * Qu) ] / (Qe+Qu)

Where:

Cm = Mixed Concentration (µg/L)
Ce = Effluent Concentration (µg/L)
Qe = Effluent Volume (liters, calculated as flow rate in cfs * constant 28.316)
Cu = Upstream concentration (µg/L)
Qu = Upstream Volume (liters, calculated as flow rate in cfs * constant 28.316)

# Appendix C

## CORMIX Modeling of Phosphorus Plumes

**Background**

When DEQ considers authorizing a mixing zone that exceeds 25% of the volume of the receiving water, a mixing zone study may be performed to learn more about the effluent plume. CORMIX is an EPA-supported model for the analysis of wastewater discharges. This study was prompted because the draft permit added a first time effluent limit for phosphorus that would require a mixing zone greater than 25%.

Treated effluent from the Sandpoint WWTP is discharged through a 3-foot diameter pipe laid on the bed of Pend Oreille River. The discharge pipe is positioned perpendicular to the riverbank in the vicinity of Birch Street and S. Ella Avenue in Sandpoint, Idaho. The pipe extends 925 feet into the river and is equipped with a 164-foot multiport diffuser. To put the flow values that are used in the modeling efforts into context, the average flow in the Pend Oreille River during July (1990-2012) was 26,396 cfs.

Summer months are significant in that phosphorus from this discharge will be utilized by aquatic plants and algae which could adversely affect recreational uses of the river. As discussed in Appendix B, phosphorus is likely the limiting nutrient in the Pend Oreille River. It fuels the growth of aquatic plants which can impair recreational use by obstructing boat operation, entangling swimmers, create cloudy and objectionable smelling water, and coating the bottom with slimy algae growths and/or dense mats of plants that preclude fishing. By definition, the area within a mixing zone exceeds the water quality standard and therefore could experience these issues. Based on comments received from the first draft permit, some residents and river users indicate that this area of the river in the vicinity and downstream of the outfall already experience some adverse consequences due to excess phosphorus. DEQ has been supplied photos and monitoring data to support these claims. For these reasons, the mixing zone size is an important consideration that warrants closer examination.

In addition to being the growing season, summer is typically when low flow conditions can occur and are the most challenging for mixing effluent and meeting provisions of the Idaho WQS for mixing zones (IDAPA 58.01.02.060). Specifically, the mixing zone rules most challenging for this discharge include:

**d.** Mixing zones, individually or in combination with other mixing zones, shall not cause unreasonable interference with, or danger to, beneficial uses. Unreasonable interference with, or danger to, beneficial uses includes, but is not limited to, the following: (4-11-15)

> vi. Conditions which impede or prohibit recreation in or on the water body. Mixing zones shall not be authorized for E. coli.

**h.** Mixing zones shall meet the following restrictions; provided, however, that the Department may authorize mixing zones that vary from the restrictions under the circumstances set forth in Subsection 060.01.i. below:

> i. For flowing waters: (4-11-15)

(1)The width of a mixing zone is not to exceed twenty-five percent (25%) of the stream width; and (4-11-15)

(2)The mixing zone shall not include more than twenty-five percent (25%) of the low flow design discharge conditions as set forth in Subsection 210.03.b. of these rules. (4-11-15)

**j.** The following elements shall be considered when designing an outfall: (4-11-15)

i. Encourage rapid mixing to the extent possible. This may be done through careful location and design of the outfall; and (4-11-15)

ii. Avoid shore-hugging plumes in those water bodies where the littoral zone is a major supply of food and cover for migrating fish and other aquatic life or where recreational activities are impacted by the plume. (4-11-15)

DEQ may authorize a mixing zone that varies from the above rules, however it must not cause an unreasonable interference with, or danger to, beneficial uses and must meet certain other rules. To obtain a larger mixing zone, the discharger must provide DEQ with an analysis that demonstrates a larger mixing zone is needed given, siting, technological, and managerial options (IDAPA 58.01.02.060.i.ii). In this case, the proposed mixing zone is 47.2% June-September and 60% October-May. The City of Sandpoint's justification is available from DEQ upon request.

**River Features That Affect the Discharge**

The Pend Oreille River is regulated by the Albani Falls dam located 27 river miles downstream of Sandpoint's outfall and is operated by the Army Corps of Engineers. A summer pool is maintained after spring runoff until early September when Pend Oreille Lake and the Pend Oreille River above the dam are drawn down for power generation. At the point of discharge, the river is approximately 1.8 miles wide but approximately 1.3 miles downstream, the river narrows considerably. Upstream of the discharge, a mile-long earthen jetty extends from the north riverbank carrying US Highway 95 across the river. This jetty creates an opening of approximately 1.1 miles for river passage. The discharge is located in an area protected from the main river flow by the jetty (see Image 1).

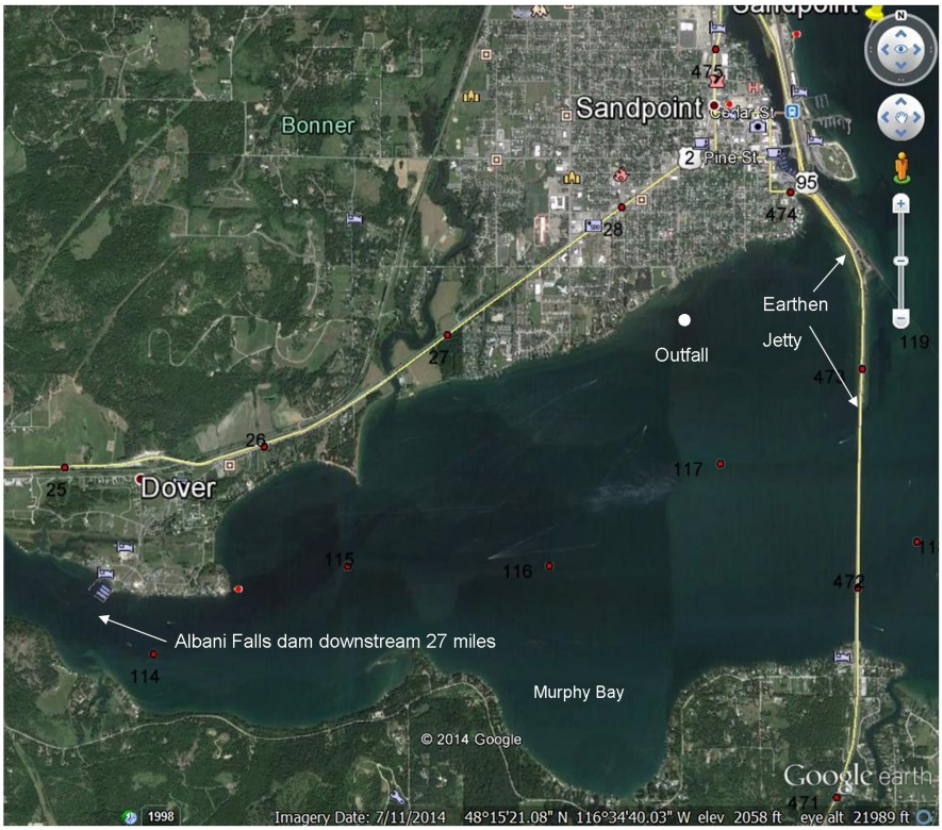



Image 1 Sandpoint Outfall and Surrounding Features

The early CORMIX modeling scenarios completed in 2013 and referenced in the first draft certification for this permit used higher concentrations of phosphorus, a lower design flow of the WWTP, a stratified temperature profile, an assumption of river current, and a larger critical river flow. The resulting plume from each of the CORMIX model runs was overlain on an aerial photo of the river as shown in Image 2. Site-specific information regarding the velocity of the river in the vicinity of the diffuser during various times of the summer was not available so estimates were made based on flow data elsewhere in the river and other available physical measurements.


**Image 2 Early CORMIX Modeling Scenario Phosphorus Concentration of 2867µg/L; Facility Design Flow of 3.62mgd and River Flow of 8,448cfs**

In Image 2, the effluent plume, which is the area that exceeds background phosphorus concentrations, is shaded in green. Also, under this scenario, due to the lack of temperature stratification from the bottom to the surface of the river and an assumption that a weak current exists, the plume rises slowly and begins to spread out rather than rapidly moving downstream. The pattern of spread is subject to localized currents from various forces such as shape of the river, wind, rainfall, boat traffic, etc. The black arrows attempt to show where these localized currents might be located due to the shape of the river. The CORMIX model cannot predict the

exact shape and size of this plume under these conditions so the green triangle shape could be highly altered depending on these localized currents. Higher river velocities would lessen the significance of localized currents. The plume extends almost bank to bank and there is a mile-long shore-hugging plume.

As a result of the above modeling effort, it became apparent that site specific data would greatly help verify or change modeling assumptions. There was also the additional challenge to develop effluent limits that accommodated the City's desire for a 2mgd design flow increase and addressed public comment concerns about mixing zone size and the potential for adverse effects to river water quality.

In response to this need, DEQ collected additional data during the summer of 2015 and it was used to run both CORMIX and another model, CE-QUAL-W2, that can examine nutrient inputs to the river as a whole. This additional modeling effort using the CE-QUAL-W2 model is detailed in Appendix D of this certification.

Results of the additional data collection and further examination of other data collection efforts indicated that flow at the diffuser location is limited largely to local phenomena rather than river flow (DEQ Staff Report 8-3-15). Temperature profiles also indicate a summertime uniform temperature in the diffuser area which inhibits mixing. DEQ Staff Report dated 12-17-15 presents the outcome of mapping the river depths to determine the location of the river's thalweg (low flow channel). Results indicate that in the vicinity of the outfall the river's main flow closely follows the southern bank which is the opposite side of the river than the outfall and a distance of approximately 1.4 miles. This reinforces initial observations that during lower flows, the outfall is in a slack water location.

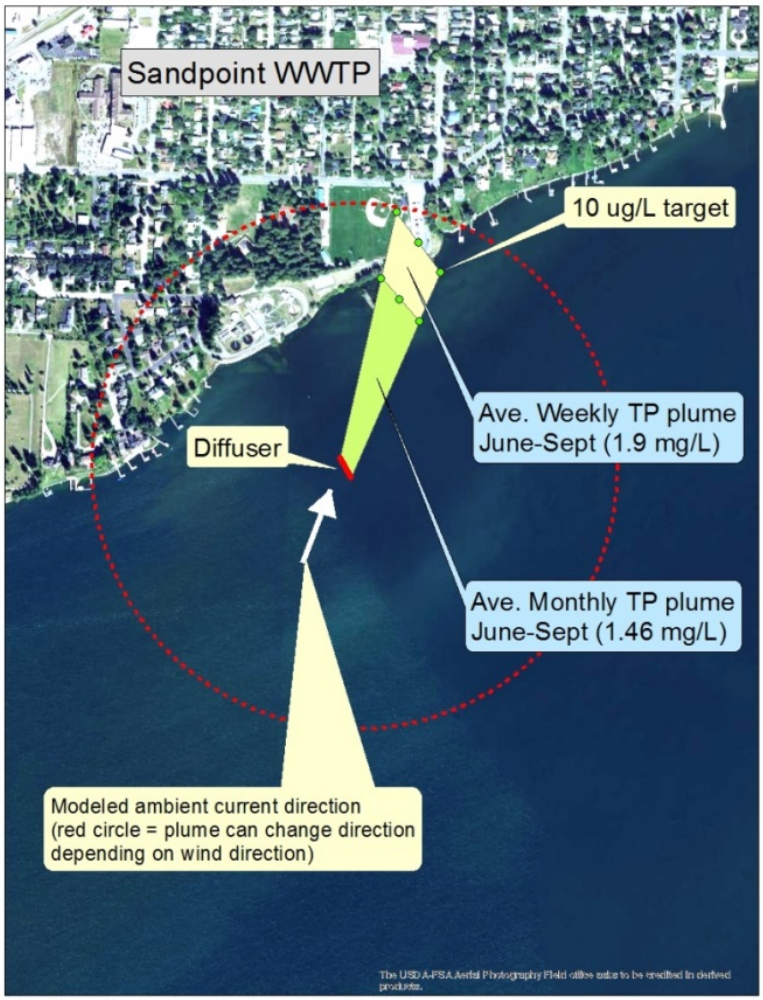



Image 3 Revised CORMIX Modeling Scenario Phosphorus Concentrations of 1463µg/L and 1899µg/L; Facility Design Flow of 5mgd; River Flow of 6,640cfs

Image 3 illustrates the results of the CORMIX modeling effort that used the additional 2015 river data and a lower summertime phosphorus concentration of 1463µg/L (which is equivalent to the proposed permit limit of 61lbs/day from June-September). It also examined the average weekly permit limit of 79 lbs/day (June-September) which is equivalent to a concentration of 1899µg/L. The green shaded area represents the average monthly limit mixing zone and the yellow shaded area represents an additional area of mixing allowed by the average weekly limit. The red dotted line indicates that the mixing zone can pivot in any direction due to slack water at the diffuser location. The shape of the mixing zone is also variable depending on wind direction and speed, boat traffic and localized currents. The model also reflects a lower critical flow than shown in Image 2 based on comments from the Kalispel Tribe.

In conclusion, existing conditions in the river indicate that the shape and size of the phosphorus plume created by the Sandpoint WWTP are not ideal. The point of discharge is in a slack water area and does not benefit from the main river flow during summer pool conditions. Increasing the amount of phosphorus as illustrated in Image 2, even by a relatively small amount, greatly

increases the size of the plume during low flow conditions. An increase is likely to be problematic for recreational uses and does not comply with DEQ's mixing zone policy.

After reducing phosphorus concentrations during the critical low flow time period from the first draft permit, modeling results as illustrated in Image 3 reduced shore hugging plumes and shows a more localized mixing zone. These conditions better align with the mixing zone policy. Appendix D of this certification further investigates the effects of the proposed phosphorus limits on the river.

# Appendix D

## CE-QUAL-W2 Phosphorus Modeling for Sandpoint WWTP

Background

In the 2008 Integrated Report, total phosphorus was added as a cause of impairment to the Pend Oreille River (the 31.8 mile long segment from Pend Oreille Lake to Priest River). After collection of data throughout this river length in 2009, DEQ concluded that the river was not impaired due to this nutrient and phosphorus was removed as a pollutant in the 2010 Integrated Report. DEQ also concluded at that time that the Pend Oreille River has little or no remaining assimilative capacity for phosphorus (2.7µg/L before considering any of the three municipal discharges into the Pend Oreille River. See discussion in Appendix B). Ten percent of 2.7ug/L is only a 0.027ug/L of phosphorus that can be increased without an approved alternatives analysis and socioeconomic justification.

DEQ also recognizes that effluent limits for phosphorus in the proposed permit are based on very little effluent data. The current permit only requires quarterly monitoring. The quarters are based on the calendar year and the phosphorus monitoring data is reported on the last day of each quarter. The discharge monitoring reports (DMRs) do not indicate the day the actual samples were collected or the effluent flow associated with that timeframe. These factors can create a wide margin of error.

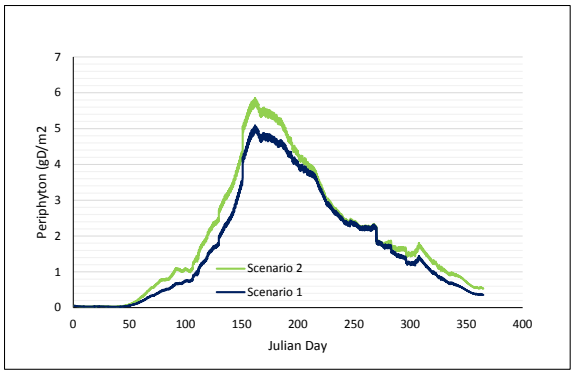
Additional examination of the phosphorus monitoring data show that it is widely distributed (effluent flow 1 to 6.7mgd and concentrations from 0.8 to 5.33mg/L). Reasons for this spread are not clear since there are not enough data to determine correlations. Determining exactly what amount of phosphorus is currently being discharged to ensure no further loss of assimilative capacity is problematic given this data. For this and the above reasons, DEQ and EPA have approached the new effluent limits for phosphorus cautiously using the previously discussed CORMIX modeling to examine mixing zone characteristics and following this with the CE-QUAL-WE modeling scenarios to look at effects downriver of the proposed phosphorus effluent limits. Although the data is limited, there were some seasonal differences which allowed development of seasonal limits that reflect discharge amounts as reported on DMRs. These seasonal limits were used for the CE-QUAL-W-2 modeling scenarios.

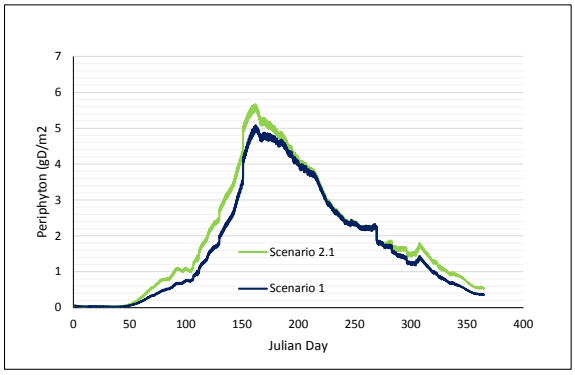
Modeling Approach

The CORMIX modeling (Appendix C of this certification) examined the near field area of the discharge. A different type of model must be used to examine the future conditions further downstream. Fortunately, a CE-QUAL-W-2 model, which can examine far field effects of a proposed discharge, had been developed by the Army Corps of Engineers to examine temperature changes as a result of the Albani Falls dam on the Pend Oreille River. This model was revised in 2011by Portland State University to investigate various phosphorus scenarios in the river. In 2015 it was used by EPA to investigate the consequences of the proposed phosphorus permit limits for Sandpoint.

The initial modeling scenario examined the consequence of a 5mgd phosphorus discharge during the *July-September* timeframe of 61lbs/day (1.46 average monthly concentrations) contrasted

with baseline conditions determined in 2009. Results of the model run were largely satisfactory except for periphyton biomass during the month of June. During this timeframe, periphyton biomass significantly departed from the existing condition. To improve the outcome of this timeframe, the month of June was included in the summertime seasonal timeframe with a limit of 61lbs/day. This reduced the load of phosphorus in June from 96 lbs/day to 61 lbs/day. The model was re-run and the outcome was satisfactory and the effluent limits revised to reflect this reduction. Below are graphs that illustrate the modeling results. Existing periphyton conditions are indicated by the blue lines and proposed conditions are the green lines. The 96 lbs/day of phosphorus in June scenario is on the left and the proposed permit limit of 61 lbs/day in June is on the right.




## Conclusion

Because the phosphorus load in the river from this discharge, given the proposed limits, is approximately 23% of the total load in the river, this discharge has the potential for significant water quality effects. As we have stated, current amounts of phosphorus discharged from the facility are an approximation due to lack of a robust dataset. The proposed permit requires the collection of an adequate number of phosphorus samples to correct this problem. To compensate for the lack of data, modeling was completed, and as a result, effluent limits and critical flows were adjusted to provide an acceptable outcome.

# Appendix E

Arsenic, Zinc, Cyanide, Nickel Significance Test

Background

The Pend Oreille River is considered high quality for recreational uses. To prevent the lowering of water quality with respect to arsenic, zinc, cyanide and nickel, DEQ must ensure that the design flow increase proposed by the Sandpoint WWTP draft permit does not decrease the remaining assimilative capacity of the river for each of these metals by more than ten percent, taking into account the size and character of the discharge and the magnitude of its effect on the receiving water (IDAPA 58.01.02.052.08.a).

Assimilative capacity is determined by comparing the background (ambient) concentration of a pollutant with the Water Quality Standard (WQS or criteria). The difference between these two numbers is the remaining assimilative capacity. Arsenic, zinc, cyanide and nickel have criteria related to human health (IDAPA 58.01.02.210.01) and thus are considered recreational uses. However, zinc cyanide and nickel also have cold water aquatic life criteria and they are much lower values than their human health criteria. Because cold water aquatic life in this waterbody receives Tier 1 protection, the more restrictive criteria must be used for this analysis.

Upstream data for these metals was extremely limited to absent. Therefore, several conservative assumptions had to be made to complete this analysis. Upstream monitoring of these metals has been included in the draft permit.

Analysis

- Background concentrations upstream of the Sandpoint discharge for cyanide and nickel is assumed to be zero due to lack of data. Arsenic and zinc were measured in the Clark Fork River below the Cabinet Gorge dam. Results were arsenic $\leq$ 1 µg/L and zinc ranged from no detection to 80µg/L with an average of 4µg/L. For this analysis zinc will be assumed to be the average value of the Clark Fork data due to the distance from the discharge and arsenic will be one half the detection limit or 0.5µg/L. To summarize background concentrations are:

  Zinc 4µg/L Arsenic 0.5µg/L Cyanide 0µg/L Nickel 0µg/L

- Remaining assimilative capacity and 10% of remaining assimilative capacity:

  Zinc 72µg/L- 4µg/L = 68µg/L X .10 = 6.8µg/L

  Arsenic 10µg/L – 0.5µg/L = 9.5µg/L X .10 = 0.95µg/L

  Cyanide 5.2µg/L – 0 = 5.2µg/L X .10 = 0.5µg/L

  Nickel 52µg/L – 0 = 52µg/L X .10 = 5µg/L

  These values are the amount of metals that can be added to the river before the amount becomes significant.
- Sandpoint proposes to increase their current design flow from 3 mgd (4.64 cfs) to 5.0 mgd (7.7 cfs).

- Effluent concentration 92nd percentile (from DMR data):
  Zinc 141µg/L
  Arsenic 7µg/L
  Cyanide 0.6µg/L
  Nickel 0µg/L (no detection in DMR data 2001-2011)
- In-river 7Q10 flow (critical low flow for chronic aquatic life criteria; see Revised Fact Sheet Appendix C) = 3,880 cfs

Results

| | |
|---|---|
| Zinc Current Mixed Concentration = 4.16µg/L | Proposed Concentration=4.27µg/L |
| Arsenic Current Mixed Concentration = 0.508 µg/L | Proposed Concentration=0.512µg/L |
| Cyanide Current Mixed Concentration = 0.0007µg/L | Proposed Concentration=0.0012µg/L |
| Nickel Current Mixed Concentration = 0µg/L | Proposed Concentration = 0µg/L |

The additional load of zinc will decrease the remaining assimilative capacity by 0.011µg/L or 0.16% of the remaining assimilative capacity of 6.8µg/L.

The additional load of arsenic will decrease the remaining assimilative capacity by 0.004µg/L or 0.42% of the remaining assimilative capacity of 0.95µg/L.

The additional load of cyanide will decrease the remaining assimilative capacity by 0.0005µg/L or 0.1% of the remaining assimilative capacity of 0.5µg/L.

There will be no additional load of nickel.

The additional load of zinc, arsenic, cyanide and nickel resulting from the design flow increase, will not exceed 10% of the remaining assimilative capacity for any of these pollutants, and considering the size and character of the discharge and the magnitude of its effect, these increases of pollutants are not a significant degradation of river water quality.

Formula used to calculate mixed concentrations:

Mixed Concentration = Cm = [ (Ce * Qe) +(Cu * Qu) ] / (Qe+Qu)

Where:

Cm = Mixed Concentration (µg/L)
Ce = Effluent Concentration (µg/L)
Qe = Effluent Volume (liters, calculated as flow rate in cfs * constant 28.316)
Cu = Upstream concentration (µg/L)
Qu = Upstream Volume (liters, calculated as flow rate in cfs * constant 28.316)